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**(54) CAPACITOR MICROPHONE**

## Abstract

### **Background Technology**

1 The invention relates to the condenser microphone which is designed while the sound wave inflow path is designed in the compression area of PCB and metallic case and it is designed on the PCB at the same time it compares to the direct the sound wave inlet tub and the inflow of the noises by howling by the external the negative principle in nature or echo or the wind is suppressed to the maximum so that the frequency response characteristics be good. The condenser microphone comprises the vibration plate in which the electrostatic capacity varied in interval with the back plate is offered to FET according to it is arranged the high position after the sound wave inflow path is formed in the compression area while being compressed in order to cover the opened side of the metallic case and single-side is shut tightly leaving the back plate arranged in the PCB, in which a plurality of sound wave inducing cavities is formed and FET, which is mounted on the PCB and is created the signal electricals, corresponding to the sound wave the connect ring in which the expanded sound wave passphrase is formed in the sound wave inflow path formed in the compression area of the metallic case and PCB it is arranged in the front of the polar holder arranged in the inner wall surface of the metallic case, and the upper of the connect ring and the regular interval and at the same time vibrate with the sound wave flowing in through the sound wave inflow path and sound wave inducing cavity and the polar chamber is formed in the center. Preferably, in the peripheral edge of PCB, a plurality of incision main parts defining the sound wave inlet is formed. In order to be communicated in the sound wave inlet formed between the metallic case and PCB the sound wave passphrase formed in the connect ring is formed.

 Fig. 3

## Description

### Brief explanation of the drawing

2 Fig. 1 is a drawing for illustrating the summary of the general condenser microphone (Capacitor Microphone)

3 Fig. 2 is an electric equivalent circuit diagram of the condenser microphone illustrated in Fig. 1

- 4 Fig. 3 is a sectional configuration of the condenser microphone according to the preferred embodiment of the present invention.
- 5 Fig. 4a is a drawing showing the structure of the metallic case comprising the condenser microphone illustrated in Fig. 3.
- 6 Fig. 4b is a drawing for illustrating the structure of PCB comprising the condenser microphone illustrated in Fig. 3.
- 7 Fig. 4c is a drawing for illustrating the structure of the connect ring comprising the condenser microphone illustrated in Fig. 3.
- 8 Fig. 5a and 5b are the referential view for illustrating the sound wave influx action of the condenser microphone according to the present invention.
- 9 Fig. 5c is a referential view for illustrating the sound wave influx action of the general condenser microphone illustrated in Fig. 1.
- 10 \* Description of the symbol of the main part of the drawing\*.
- 11 10: metallic case 12: vibration plate.
- 12 14: back plate 20: connect ring.
- 13 22: polar holder 24: FET.
- 14 28: PCB, 30: metallic case.
- 15 32: PCB, 34: sound wave inlet.
- 16 36: sound wave inducing cavity 38: FET.
- 17 40: polar holder 42: connect ring.
- 18 44: back plate 48: vibration plate.

## ◎ Details of the Invention

### › Purpose of the Invention

The Technical Field to which the Invention Belongs and the Prior Art in that Filed

- 19 The invention relates to the condenser microphone. And more specifically, for example, it is about the condenser microphone which is applied to the communications device for the communicating of the voice even though the audio device for the audio processing and changes the voice into the electric signal.
- 20 As is known before, even though the audio device for the audio processing, the voice is input in the communications device (the portable communications instruments etc. for example, the general phone) for the communicating of the voice and the microphone for changing into the electric signal is included.
- 21 Fig. 1 is a drawing illustrating the summary of the general condenser microphone.
- 22 In the drawing, the case marked as 10 has the function of the protective cap which prevents the inflow of the electrical noises from outside with compressing the element of the condenser microphone which is usually formed into the aluminum while the sound wave inlet (10a) is formed in the single-side and comes under the hermetic sealing and preventing the particle inflow from outside.
- 23 If it vibrates in the state that usually vapors deposit Ni in PET or the PPS film and is formed and keeps the back plate which will be described later and the minute interval with the sound wave and it raises the distance variation, the vibration plate (Diaphragm) marked as 12 does the action occurring due to the change of the electrostatic capacity the distance variation electricals.
- 24 It stamps the panel in which the FEP film is adhered in for example, the SUS board to the press die and the back plate marked as 14 manufactures. It is generally charged to the high voltage of the number KV and the back plate role is done. And the phenomenon is referred to 'electret' while the charged dislocation decides the sensitivity of the corresponding to condenser microphone.

- 25 It stamps for example, the SUS304 panel to the press die and the diaphragm polar ring marked as 16 manufactures. It is generally used for the support of the vibration plate (12).
- 26 It serves as the spacer role and the insulation material in which the spacer marked as 18 is allowed in between the vibration plate (12) and back plate (14) and making maintain the interval constanting the reciprocity. The PET film is stamped usually to the press die and it manufactures.
- 27 And in Fig. 1, the connect ring marked as 20 has the function of electrically connecting the gate and back plate (14) of the field effect transistor (FET) which will be described later. After punching with press the brass, it plates to the gold and mostly manufactures.
- 28 It is assembled with the back plate (12) and connect ring (20) and the polar holder (I.R ring) marked as 22 actuates as the instrument support and insulator. It preferably performs injection molding to the ABS material and it manufactures.
- 29 FET marked as 24 functions as the impedance converter resulting in the electrical capacity variation to the change of the impedance and transfers the change signal to the amplifier (illustration is the omission) of backend.
- 30 The chip capacitor marked as 26 does the action of being connected between source and drain of the FET (24) and attenuating the high frequency noise flowing in from outside.
- 31 And PCB marked as 28 does the rear cover and role for output terminal of the corresponding to condenser microphone. It is composed according to the use of the contact type and fined, and soldered type.
- 32 In the f which Fig. 2 shows the electric equivalent circuit diagram of the condenser microphone illustrated in Fig. 1, and the interval of the vibration plate (12) forming condenser the sound wave is delivered to the vibration plate (12) through the sound wave inlet (10a) formed in the front end face of the metallic case (10) according to action of the general condenser microphone shown in figures 1 and figures 1 and back plate (14), the electrostatic capacity is signal-changed.
- 33 The output it electricals, of the variable condenser is amplified based on the action of the vibration plate (12) through the impedance transformation by the FET (24). The amplified output appears on the PCB (28) between the output terminal (OUT) and the GND (G) defining.

#### Technical challenges of the Invention:

- 34 But in the general condenser microphone shown in figures 1 and figures 1 the sound wave inducing cavity is formed into acropetal. Therefore in case the condenser microphone is applied to for example, the portable communications terminal, it incomes in the portable communications terminal and the voice outputted with receiver flows in the condenser microphone. It easies that howling or echo is in conclusion created.
- 35 And in the general above-described condenser microphone, the actual condition difficult to expect the frequency response characteristics uniform to secure volume it best suited as the FET (24) is located in the polar chamber defined between the back plate (14) and PCB (28) because of difficulting.
- 36 Moreover, it easies that the unnecessary gap is formed between the metallic case (10) and PCB (28) in case the metallic case (10) and PCB (28) are combined with pressing. The task in which the low frequency attenuation characteristic fail is caused with the gap frequents, it is caused.
- 37 Therefore, the invention relates to the structure it is included in consideration of the circumstances of the above-described prior art, and while the noises by howling or echo or the wind is not created even in case of the sound wave inlet is formed on the compression area of the metallic case and PCB with forming the sound wave inducing cavity on PCB in which FET is mounted and applying to for example, the portable communications terminal, of the low frequency attenuation characteristic by the gap generation in the pressing of PCB and metallic case bettering with the polar chamber of the fixed volume being secured and obtaining the uniform frequency response characteristics. And the purpose has the designed condenser microphone in providing.

- 38 To achieve the above object, according to a preferred embodiment of the present invention, provided is the condenser microphone which the sound wave inflow path is formed in the compression area while being compressed in order to cover the opened side of the metallic case and single-side is closed the PCB, FET, the connect ring, and the vibration plate is included at the same time is composed. As to PCB, a plurality of sound wave inducing cavities is formed. FET is mounted on PCB and is created the signal electricals, corresponding to the sound wave. As to the connect ring, the expanded sound wave passphrase is formed in the sound wave inflow path formed in the compression area of the metallic case and PCB it is arranged in the front of the polar holder arranged in the inner wall surface of the metallic case. As to the vibration plate, the electrostatic capacity which is varied in interval with the back plate according to it is arranged the high position after leaving the back plate arranged in the upper of the connect ring and the regular interval and vibrate with the sound wave flowing in through the sound wave inflow path and sound wave inducing cavity is offered to FET and the polar chamber is formed in the center.
- 39 According to the invention, in the peripheral edge of PCB, a plurality of incision main parts defining the sound wave inlet is formed. The rearward of the incision main part is taper-processed to the depth constant in the upper side and lower-part and the sound wave inflow smooths.
- 40 And in order to be communicated in the sound wave inlet formed between the metallic case and PCB the sound wave passphrase formed in the connect ring is formed.
- 41 In the condenser microphone according to the present invention of the above-described configuration, the sound wave inlet forming the sound wave route in the compression area of the metallic case and PCB is formed and a plurality of sound wave inducing cavities is formed on the PCB at the same time it compares to the structure where the sound wave directly flows in and the bad effect by howling by the negative principle in nature and/or echo or the outside wind is controlled.
- 42 And as the polar chamber of the fixed volume is formed in the inner side of the vibration plate while FET is installed in the lower of the metallic case, the uniform frequency response characteristics is guaranteed. And the bad effect by the gap generation is excluded in the pressing of PCB and metallic case the one's utmost exertion as the sound wave inlet is formed in the compression area of PCB and metallic case.

#### → Structure & Operation of the Invention

- 43 Hereinafter, it specifically explains for the invention with reference to the attached view.
- 44 Fig. 3 is a sectional configuration of the condenser microphone according to the preferred embodiment of the present invention.
- 45 According to the condenser microphone of the invention illustrated in Fig. 3, the sound wave inlet (34) defineds in the compression area of the PCB (32) and the metallic case (30) consisting of the aluminum and the inflow (34a in the drawing 3) of the sound wave for example possibles through the sound wave inlet (34).
- 46 And one or more sound wave inducing cavity (36) is formed in the PCB (32) and the inflow (36a) of the sound wave similarly possibles with the sound wave inlet (34). The FET (38) is mounted on the PCB (32).
- 47 Here, in the inner surface of the case (30), the air hole (30a reference in the drawing 4a) for discharging the air of inside is formed.
- 48 Preferably, in according to the invention, the peripheral of the PCB (32), even in case of being compressed with the metallic case (30), in order to the sound wave inlet (34) makes be formed a plurality of incision main parts (32a) is formed at the predetermined location (refer to Fig. 4b).
- 49 Here, it more favorables, it is formed about the rear in which a plurality of incision main parts (32a) is formed on the PCB (32) for the inflow of the better sound wave into the structure of being tapered to the depth in which the upper side and lower-part constant (refer to Fig. 4b).
- 50 And in the inner wall surface of the metallic case (30), the polar holder (40) is arranged and the f in which the connect ring (42) is arranged in the front of the polar holder (40), and the connect ring (42) are formed into the form illustrated in the drawing 4c in the bottom at the interval in which the sound wave passphrase (42a) constants at the same time.
- 51 And the f in which the back plate (44) in which the sound wave pass hole (44a) is mostly formed on the connect ring (42) in the core region is arranged, and the out edge part of the back plate (44) are according to the invention supported with the polar holder (40).

- 52 The spacer (46) is mediated on the polar holder (40) and the vibration plate (48) is arranged with that.
- 53 Here, the action of the condenser microphone according to the invention illustrated in Fig. 3 and the whole function are similarly included with the general condenser microphone which it referring to Fig. 1 explains.
- 54 However, in case of the general metallic case (10) illustrated in Fig. 1, because of a plurality of sound wave inducing cavities for the inflow of the sound wave being formed in the single-side and being directly transmitted the sound wave, the voice from receiver in fact flows in the portable communications terminal in application and influence by howling or echo and/or the wind noises is received for example. However, according to keep the shape in which the single-side of the metallic case (30) shown in Fig. 3 is shut tightly, the voice from receiver in fact flows in the portable communications terminal in application and the influence of howling or echo and/or the wind noises for example remarkably betters.
- 55 That is, referring to figures 5a and figures 5a in case the condenser microphone (64) according to the present invention is mounted in the top (Fig. 5a) of the main board (62) of the portable communications terminal (60) or the lower part (Fig. 5b) if it explains, because the sound wave directly does not flow in the condenser microphone (64) and the sound wave flows in from the lateral direction, the negative principle in nature domain (66a) of the receiver (66) of the self-abuse domain (64a) of the condenser microphone (64) and portable communications terminal (60) are differently formed the reciprocity and howling or echo is excluded and the noises by the wind remarkably betters.
- 56 In case of that, referring to Fig. 5c, the general condenser microphone illustrated in Fig. 1, the domain in which the self-abuse domain (74a) of the condenser microphone (74) is overlapped with the cathodal area (76a) of the receiver (76) of the portable communications terminal (70) is created in the state where the condenser microphone (74) coming under on the main board (72) of the portable communications terminal (70) is mounted and howling and/or echo is created. It easies that the noises by the wind flows in in-operation.
- 57 And in the volume of the polar chamber (50) formed in the vicinity of according to the invention, the vibration plate (48), the volume is regularly secured because of not being occupied to the structure of the condenser microphone illustrated in Fig. 1 with the FET (38). The uniform frequency response characteristics gets from the polar chamber (50) of the fixed volume.
- \* Effects of the Invention
- 58 As described above, according to the condenser microphone according to the present invention, because the major sound wave inflow path is formed in the compression area of PCB and metallic case, it compares in case of the general condenser microphone in which the sound wave inflow path is formed in the single-side of the metallic case and the noises by the howling caused by or echo and wind remarkably betters in the close placement of the audio output circle (for example, the receiver in the application in the portable communications terminal).
- 59 And design possibles so that the polar chamber have the volume in which the polar chamber constants with being arranged according to be present before the upper of the FET as discrete and the secure of the frequency response characteristics of uniforming possibles in the near FET is the sound wave inflow path in the inside of the metallic case.
- 60 Furthermore, the burden about the pressing of the metallic case and PCB are according to the invention commuted because of designing the sound wave inflow path in the compression area of PCB and metallic case.

## Scope of Claims

Claim [1] :

61 The condenser microphone wherein single-side is shut tightly and the metallic case the opposite side is opened, and the vibration plate is included and it is composed, and as to the vibration plate, the electrostatic capacity varied in interval with the back plate is offered to FET according to it is arranged the high position after leaving the back plate arranged in the upper of the connect ring : connect ring in which the expanded sound wave passphrase is formed in the sound wave inflow path formed in the compression area of the metallic case and PCB it is arranged in the front of the polar holder arranged in the inner wall surface that the sound wave inflow path is formed in the compression area and it is mounted on the PCB : PCB in which a plurality of sound wave inducing cavities is formed at the same time while being compressed in order to cover the opened side of the metallic case are created the signal electricals, corresponding to the sound wave of the FET : metallic case and the regular interval and vibrate with the sound wave flowing in through the sound wave inflow path and sound wave inducing cavity and the polar chamber is formed in the center.

**Claim[2] :**

66 The condenser microphone, wherein the rearward of the incision main part a plurality of incision main parts defining the sound wave inlet is formed as to the first claim in the peripheral edge of PCB it is taper-processed to the depth in which the upper side and lower-part constant.

**Claim[3] :**

67 The condenser microphone, wherein the sound wave passphrase formed as to the first claim in the connect ring it is formed in order to be communicated in the sound wave inlet formed between the metallic case and PCB.

